

# Zanzibar Board Factory Tests

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## Purpose

The purpose of this test procedure is to validate the functionality of the Zanzibar video processing board prior to leaving the BOE factory.

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## Required Materials

1. PC with Windows and a Nvidia GTX 980 graphics card or equivalent that can connect at 4K60 over DisplayPort 1.2 and HDMI 2.0 and a Ethernet network card.
  2. USB Type A to Type B cable.
  3. USB Thumb drive, preferably formatted FAT 32. With the following files included
    - autorun.pkg
    - firmware.pkg
    - manifest
    - Patterns/4K\_checkerboard.png
    - Patterns/4K\_grayramp.png
    - Patterns/4K\_colorbar.png
    - A looping audio file with left and right channels.
  4. Female DB9 loopback plug (TX and RX pins tied together).
  5. Modified OPS docking board (with modifications to test OPS Serial, and GPIO).
  6. Modified OPS docking board cable (with modifications to power the docking board from the +5V and +12V on the Zanzibar board, and a pigtail to connect to the Power Supply status connector)
  7. 1 IR/EEPROM board and cable
  8. 1 Zanzibar keypad and cable
  9. 1 IR Remote receiver
  10. 1 HDMI 2.0 cable.
  11. 2 DisplayPort cables.
  12. 1 4K60 capable DisplayPort monitor.
  13. Bench power supply and cables for the Zanzibar board
  14. 1 55" Vby1 4K test panel
  15. 1 28" LVDS FHD test panel
  16. 1 set of Vx1 cables
  17. 1 LVDS cable
  18. Stereo Head phones with 3mm mini jack.
  19. Zanzibar speakers with cable.
  20. SPDIF capable speaker or Amplifier and optical SDIF cable.
  21. USB LED lamp
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## PC Setup

1. Copy the .png pattern files from the UBS thumb drive to a folder on the PC. Use the Windows 8 Photo viewer (or equivalent) to view the patterns full screen. Windows 8 Photo viewer allows the user to cycle through the images using the keyboard arrow keys.
  2. Begin looping the audio test file on the PC.
  3. Open the Nvidia control panel application (right click on the Desktop and select the Nvidia control panel). Select the HDCP status page from the list on the left.
  4. The PC network adapter must be configured with the IP address 192.168.12.2, with a network mask of 255.255.255.0.
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## Board setup

Make all of the following connections prior to first powering on the board (see note below).

1. Connect Power supply, back light, and TCON connectors P119, P101, P136, P139
  2. Connect the Speakers to connector P135
  3. Connect the Keypad to connector P122
  4. Connect the OPS docking test board to the Power Supply status connector P105 and OPS connector P138
  5. Connect the USB LED lamp to connector P126
  6. Connect the USB thumb drive to connector P127
  7. Plug the USB Type A to Type B cable into connectors P125 and P120
  8. Connect the CAT 5 Ethernet cable into connector P131. Plug the other end of the CAT 5 cable into the PC ethernet interface.
  9. Connect the IR/EEPROM board to connector P130
  10. Connect the IR Receiver to connector P129
  11. Connect the DB9 loopback connector to connector P108
  12. Connect the SPDIF cable to connector P128, connect the other end to the SPDIF amplifier.
  13. Connect the stereo headphones to connector P142.
  14. Use a DisplayPort cable to connect the 4K60 capable monitor to the DisplayPort out connector P109
  15. Connect a DisplayPort cable to one of the DisplayPort out connectors on the PC, DO NOT connect this to the DisplayPort in connector P110 on the board until prompted to by the test.
  16. Connect one of the PC HDMI outputs to the OPS HDMI connector P115
  17. Connect the 28" FHD LVDS panel to the P116 connector with the LVDS cable.
  18. Connect the Vx1 ribbon cables to the 55" 4K Vx1 test panel.
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## Test Procedure

The test script is contained in the file **autorun.pkg** on the USB thumb drive. The firmware that must be installed on the board to run the tests is contained in the file **firmware.pkg** on the USB thumb drive. The file **manifest** on the USB thumb drive is used by the test script to determine if firmware in **firmware.pkg** matches the firmware on the board. The manifest and firmware.pkg file on the USB drive are optional, if they are not present the test script will skip the firmware version check.

1. On first power up of a board a first time boot sequence is run to format the NAND flash (I135) for the AM3352 processor. This process takes approximately 1 minute 30 seconds to complete. During this time the LEDs D100 and D165 will be on solid. If power is removed during this time NAND flash may become corrupted and a separate NAND flash recovery procedure will have to be followed. The first time boot sequence is complete when LEDs D100 and D165 turn off and LED D181 is flashing at 1HZ.
2. Shortly after the first time boot sequence completes an image will be displayed on the Vx1 test panel.
3. The test script will start shortly after the image first appears.
4. The test script will verify the board firmware and perform a firmware update if the versions do not match. If a firmware update is required wait until the firmware update complete message is displayed and then power cycle the system.
5. The test script will start by setting the Real Time Clock (RTC) to a known date and time and then prompt the user to cycle AC power to complete the test.
6. After the AC power cycle the script checks that the RTC date and time is within 10 minutes of the date and time that were set prior to cycling power. If the AC power cycle is not completed with 10 minutes the RTC test will fail. If this occurs the test can be restarted from step 9 by simply power cycling the board again.
7. After the RTC test has completed the test script will automatically test each of the following connectors: P138, P125, P120, P130, P131, P108. If any of the test fail the script will halt and a message will be displayed indicating which connector failed.
8. The operator will then be prompted to press all buttons on the keypad to test connector P122, this test must be completed with 30 seconds or the test will fail.
9. The operator will then be prompted to press the "Prev" key on the IR remote to test connector P129.
10. The operator will then be prompted to disconnect the IR receiver from P129 and press the "Menu" key on the IR remote to test the IR pins on P130.
11. The test script will then check that all pins on connector P105 are high. The operator will then be prompted to disconnect the cable from connector P105, the script will then check that all the pins read low.
12. The operator will then be prompted to check the stereo headphone mini connector P142. The operator should listen to the left and right headphone speakers and verify that a separate tone is present in each. The operator can confirm the connector is functional by pressing the Enter key on the keypad or IR remote.
13. The operator will then be prompted to check the speaker connector P135 functionality. The same left and right tones should now be heard on the speakers. The operator can confirm the speaker connector is functional by pressing the Enter key on the keypad or IR remote.
14. The operator will then be prompted to check the SPDIF connector P128 is functional. The operator will confirm the connector is functional by pressing the Enter key on the keypad or IR remote.
15. The operator will then be prompted to connect the HDMI cable to the HDMI OPS connector P115 (the cable should already be connected so this prompt may not appear).
16. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 60Hz".
17. The operator will then be prompted to verify the OPS HDMI connector P115 by viewing each of the 3 patterns (Checkerboard, Color bars, and Gray ramp) and checking the HDCP and EDID functionality by viewing the Nvidia Control panel HDCP status page. The operator MUST refresh the HDCP status page in the Nvidia control panel by using a mouse to navigate to another

- page and then back to the HDCP status page. The HDCP status page should identify the display as a Planar display and that the Display is HDCP capable. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
18. The operator will then be prompted to connect the HDMI cable to the HDMI 1 connector P111.
  19. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 60Hz".
  20. The operator will then be prompted to verify the HDMI 1 connector P111 by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator can confirm the connector is functional by pressing the Enter key on the keypad.
  21. The operator will then be prompted to connect the HDMI cable to the HDMI 2 connector P112.
  22. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 60Hz".
  23. The operator will then be prompted to verify the HDMI 2 connector P112 by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator can confirm the connector is functional by pressing the Enter key on the keypad.
  24. The test script will then check the HDMI 2 30Hz path by switching to a 2 zone multi-view setting.
  25. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 30Hz".
  26. The operator will then be prompted to verify the HDMI 2 30Hz path by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
  27. The operator will then be prompted to connect the HDMI cable to the HDMI 3 connector P113.
  28. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 30Hz".
  29. The operator will then be prompted to verify the HDMI 3 connector P113 by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
  30. The operator will then be prompted to connect the HDMI cable to the HDMI 4 connector P114.
  31. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 30Hz".
  32. The operator will then be prompted to verify the HDMI 4 connector P114 by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
  33. The operator will then be prompted to connect the DisplayPort cable to the DisplayPort in connector P115. The HDMI cable should be removed from the HDMI4 connector P114.
  34. The test script will wait for the board to sync and will check that it is syncing with the PC at "3840x2160 60Hz".
  35. The operator will then be prompted to verify the DisplayPort connector P115 by viewing each of the patterns and checking the HDCP and EDID status in the Nvidia control panel. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
  36. While the operator is verifying the DisplayPort In connector P115 they should also verify the DisplayPort Out connector P109 is functioning by checking that the patterns are displaying properly on the second monitor. After confirming that the DisplayPort In connector is working the operator will be prompted to confirm that the DisplayPort Out connector is working.
  37. The test script will now configure the board settings for the LVDS panel, the test script will perform a soft reset to apply the changes (takes about 10 seconds).
  38. After the soft reset the image will be displayed on the LVDS monitor. The operator will then be prompted to verify the image on the LVDS connector, checking each of the test patterns. The operator will confirm the connector is functional by pressing the Enter key on the keypad.
  39. The test script will now reconfigure the board for Vx1-120Hz test panel and perform a soft reset.
  40. Once the soft reset is complete the image will be displayed on the Vx1-120Hz test panel.
  41. At this point all tests have completed, the script will perform a full factory reset and the All Tests Passed message will be displayed.
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## Additional Notes:

- In general the test script can be restarted by AC power cycling the board at anytime.
- AC Power cycling the board during the initial first time boot process may cause the board to become unresponsive and require a NAND flash recovery procedure to be preformed.
- If any test fails the test script halts and a test failure message is displayed on the screen indicating the connector or component that has failed. A test failure log file is written to the board indicating the failed component. A diagnostics package "planar-diagnostics.bin" file is also saved to the USB drive (see the SAVE.DIAGNOSTICS(USB) api command).
- If a test fails the LEDS D100, D165, D166, and D167 will flash at a 1Hz rate to indicate failure.
- As tests are successfully completed their completion is recorded to a file on the board and if the test script is restarted those tests will be skipped. Upon completion of all tests the completed test log is archived and the next time the tests are started all the tests will be run and a new log will be started.